

Exhibit 1

RECEIVED	DATE	12/5-97
	TIME	

TSMC INVENTION DISCLOSURE		PAGE 1 OF 3		TSMC CONFIDENTIAL (WHEN COMPLETED)	
FULL NAME(S) OF INVENTOR(S)	EMPLOYEE NO.	DEPARTMENT	TEL. NO.	FOR USE BY INTELLECTUAL PROPERTY LAW	
S. L. Shue	955606	RD	3475	DISCLOSURE NO. TSC-97-542	
		233		WHERE & WHEN RECEIVED: TSMC, TAIPEI, U.S.A.	

TITLE OF INVENTION --

A Novel Planarization Method of Copper Damascene

BACKGROUND INFORMATION -- CURRENT PRACTICE AND DISADVANTAGES

Copper damascene wiring is one of the most promising technologies to reduce the RC delay as well as to perform the shrinkage of interconnect structures. Metal filling into not only submicron trenches but also submicron holes is the key for damascene wiring. To realize the Cu-damascene wiring, new technologies with excellent step coverage such as MOCVD and electroplating deposition have been studied. After Cu deposition, the polishing process is required to remove only top of the surfaces, and not to encroach on the trench for patterned sample. There are several typical issues which have to be solved before the damascene can be widely used. Fig. 3 illustrates typical problems for the planarization damascene using CMP techniques. There are residual metal on the larger open area and dishing in the wide field regions of the patterns.

MAIN POINTS OF CLAIM (PLEASE LIST ITEM BY ITEM)

1. Reduction of nonuniformity of Cu CMP by reverse tone trench photo on large open area;
2. Using electroplating method to remove Cu from large open area;
3. Apply to other damascene such as Au, Al, etc.

PROBLEM SOLVED OR IMPROVEMENTS OBTAINED BY THIS INVENTION (PLEASE LIST ITEM BY ITEM)

1. Reduction of nonuniformity on the wafer surface;
2. Improve the recess after Cu CMP;
3. Reduce the oxide erosion after damascene CMP process;
4. Release the grouping of pattern density issue;

KEYWORD SEARCH FOR PATENT/LITERATURES

Damascene, electroplating, electropolishing, CMP

PATENT/LITERATURES SEARCH RESULT (PLEASE SPECIFY SIMILAR PATENT NO. AND LITERATURE CITATION)

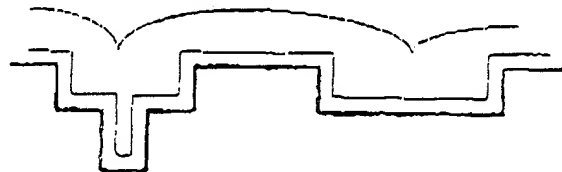
Literature:

Y.M. Dubin, et al, VMIC '97, p.69

DETAILED DESCRIPTION OF INVENTION -- (CONTINUED NEXT PAGE)

The process flow of this novel process is listed as following:

1. Dual Damascene Patterning
2. Barrier Metal Deposition
3. Seed Layer Deposition
4. Copper Electroplating
5. Reverse Tone Photo for Large Area
6. Electroplating by reverse current
7. PR stripping
8. Cu/Barrier layer CMP
9. Cap Layer



Disclosure No : 1-97-542

Inventor Name : S. L. Shue

Title : A NOVEL PLANARIZATION METHOD OF COPPER DAMASCENE

Comment : (GS)

UNDERSTAND THIS ENTIRE INVENTION DISCLOSURE	DATE	INVENTOR'S SIGNATURE	DATE
SIGNATURE OF WITNESS	DATE	INVENTOR'S SIGNATURE	DATE
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SIGNATURE OF WITNESS	DATE	INVENTOR'S SIGNATURE	DATE
楊淑敏			

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DETAILED DESCRIPTION OF INVENTION -- CONTINUED

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(A-2). Electropolishing by reverse current

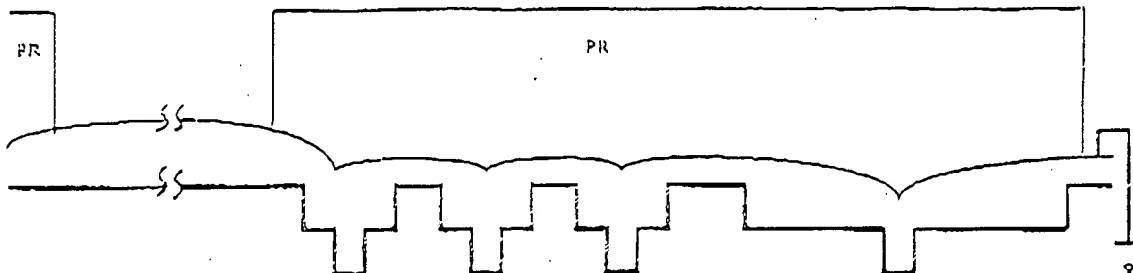


Fig. 5

(A-3). PR Stripping



Fig. 6

(B). During CMP

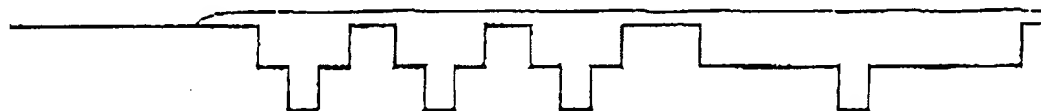


Fig. 7

(C). After CMP



Fig. 8

WITNESSES: THE TWO WITNESSES WHOSE
SIGNATURES APPEAR BELOW HAVE READ AND
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DISCLOSURE.

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Ray White [Redacted]

SIGNATURE OF WITNESS DATE

DISCLOSURE SUBMITTED BY

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DATE

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DETAILED DESCRIPTION OF INVENTION -- CONTINUED

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Conventional Method

(A). Before CMP

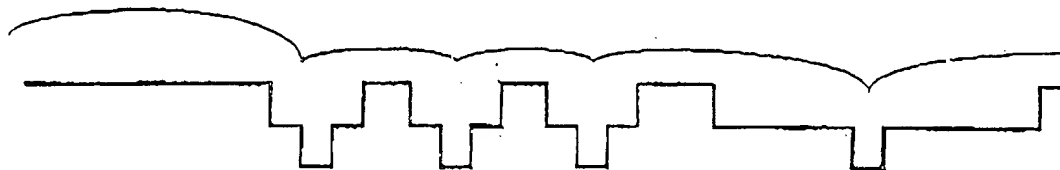


Fig. 1

(B). During CMP



Fig. 2

(C). After CMP



Fig. 3

Novel Method

(A-1). Reverse Tone Photo for Larger Area

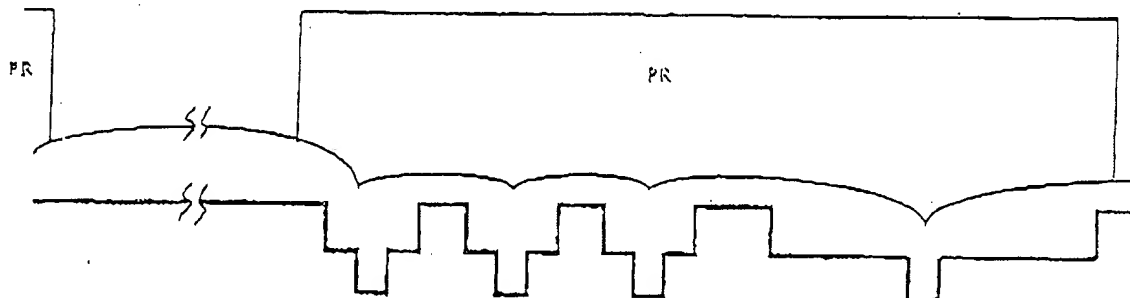


Fig. 4

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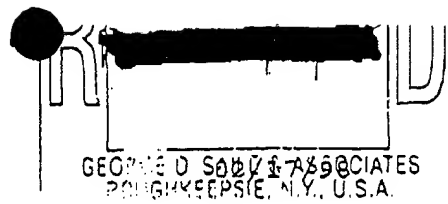
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Exhibit 2

To : George O. Saile
Fm : TSMC / Patent Affairs



Subj : Comments of the Invention Disclosures

Disclosure No : 1-98-021
Inventor Name : S.M.Jang
Title : METHOD OF FORMING Al OR Cu DAMASCENE STRUCTURE.
Comment : (GS) 1.COMBINE THIS PATENT APPLICATION IN TSMC97-542 2.FULLY
REVERSE-TONE IS NOT NECESSARY FOR PRACTICAL USE. RELAXED
REVERSE-TONE IS MORE PRACTICAL (SEE THE PRESENT MATERIAL)
3.MERGED INTO TSMC97-542 4.FILING AS SOON AS POSSIBLE.

-- the end --